

AD-A242 135



DTIC

CRM 91-85 / June 1991

2

# Development of ASVAB Norms for the Student Testing Program

D. R. Divgi

**CNA**

**CENTER FOR NAVAL ANALYSES**

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

91 10 24 144

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

Work conducted under contract N00014-91-C-0002.

This Research Memorandum represents the best opinion of CNA at the time of issue.  
It does not necessarily represent the opinion of the Department of the Navy.

# REPORT DOCUMENTATION PAGE

Form Approved  
OPM No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)	2. REPORT DATE June 1991	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Development of ASVAB Norms for the Student Testing Program		5. FUNDING NUMBERS C - N00014-91-C-0002 PE - 65153M PR - C0031	
6. AUTHOR(S) D.R. Divgi			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Naval Analyses 4401 Ford Avenue Alexandria, Virginia 22302-0268		8. PERFORMING ORGANIZATION REPORT NUMBER CRM 91-85	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Commanding General Marine Corps Combat Development Command (WF 13F) Studies and Analyses Branch Quantico, Virginia 22134		10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The Armed Services Vocational Aptitude Battery (ASVAB) is administered in high schools and postsecondary schools as part of the Defense Department's Student Testing Program. Norms for 11th and higher grades are based on a national sample tested in 1980 as part of the Profile of American Youth (PAY) study. Tenth grade norms use, in addition, a nonrandom sample collected in 1984 by the Military Entrance Processing Command (MEPCOM). With the introduction of Forms 18 and 19, scores will be reported on three composites and ten subtests. The objective of this research memorandum is to present norms for these scores.			
14. SUBJECT TERMS Aptitude tests, ASVAB (armed services vocational aptitude battery), Normalizing (statistics), Performance (human), Recruiting, Scoring, Statistical analysis, Statistical samples, Test scores, Youth		15. NUMBER OF PAGES 47	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT CPR	18. SECURITY CLASSIFICATION OF THIS PAGE CPR	19. SECURITY CLASSIFICATION OF ABSTRACT CPR	20. LIMITATION OF ABSTRACT SAR

NSN 7540-01-280-5500

Standard Form 298, (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18  
299-01

91-14033



**CNA****CENTER FOR NAVAL ANALYSES**

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268 • (703) 824-2000

12 July 1991

## MEMORANDUM FOR DISTRIBUTION LIST

Subj: Center for Naval Analyses Research Memorandum 91-85

Encl: (1) CNA Research Memorandum 91-85, *Development of ASVAB Norms for the Student Testing Program*, by D.R. Divgi, Jun 1991

1. Enclosure (1) is forwarded as a matter of possible interest.
2. The Armed Services Vocational Aptitude Battery (ASVAB) is administered in high schools and postsecondary schools as a part of the Defense Department's Student Testing Program. Norms for 11th and higher grades are based on a national sample tested in 1980 as a part of the Profile of American Youth (PAY) study. Tenth grade norms use, in addition, a nonrandom sample collected in 1984 by the Military Entrance Processing Command (MEPCOM). With the introduction of Forms 18 and 19, scores will be reported on three composites and ten subtests. The objective of this research memorandum is to present norms for these scores.

Lewis R. Cabe  
Director  
Manpower and Training ProgramDistribution List:  
Reverse page

Accession For	
NTIS GRA&I	✓
DTIC TAB	
Unannounced	
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

Subj: Center for Naval Analyses Research Memorandum 91-85

Distribution List

**SNDL**

A1 DASN - MANPOWER  
A1H ASSTSECNAV MRA  
A2A CNR  
A6 HQMC MPR & RA  
Attn Code M  
Attn Code MP  
Attn Code MR  
Attn Code MA  
Attn Code MPP-54  
FF38 USNA  
Attn Nimitz Library  
FF42 NAVPGSCOL  
FF44 NAVWARCOL  
Attn: E-111  
FJA1 COMNAVMILPERSCOM  
FJA13 NAVPERSRANDCEN  
Attn Technical Director (Code 01)  
Attn Dir, Testing Systems (Code 13)  
Attn Technical Library  
Attn Dir, Personnel Systems (Code 12)  
Attn CAT/ASVAB PMO  
Attn Manpower Systems (Code 11)  
FJB1 COMNAVCRUITCOM  
FT1 CNET  
V12 MCCDC  
Attn Training and Educations Center  
Attn Warfighting Center (WF-13F)

**OPNAV**

OP-11B

OP-136

**OTHER**

Military Accession Policy Working Group (18 copies)

Defense Advisory Committee on Military Personnel Testing (8 copies)

# **Development of ASVAB Norms for the Student Testing Program**

D. R. Divgi

*Operations and Support Division*



---

**CENTER FOR NAVAL ANALYSES**

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

---

## ABSTRACT

The Armed Services Vocational Aptitude Battery (ASVAB) is administered in high schools and postsecondary schools as a part of the Defense Department's Student Testing Program. Norms for 11th and higher grades are based on a national sample tested in 1980 as a part of the Profile of American Youth (PAY) study. Tenth grade norms use, in addition, a nonrandom sample collected in 1984 by the Military Entrance Processing Command (MEPCOM). With the introduction of Forms 18 and 19, scores will be reported on three composites and ten subtests. The objective of this research memorandum is to present norms for these scores.

## EXECUTIVE SUMMARY

### INTRODUCTION

The Department of Defense (DOD) uses the Armed Services Vocational Aptitude Battery (ASVAB) to determine the enlistment eligibility of applicants for the four military services. ASVAB scores are also used to assign enlistees to military jobs. In addition, the ASVAB is administered in participating high schools and postsecondary schools as part of the DOD Student Testing Program. It is taken by more than a million students per year in more than 15,000 schools. ASVAB results are useful to students and school officials as a counseling resource. ASVAB scores are reported as percentile ranks relative to the national population, separately for men and women in each grade. Calculation of percentile ranks requires national norms.

In the Profile of American Youth (PAY) study, the ASVAB was administered in 1980 to a nationally representative sample of 16- to 23-year-olds. This sample provides national norms for the youth population (18- to 23-year-olds), two-year colleges, and high school grades 11 and 12. In a special administration in late 1984, the Military Entrance Processing Command (MEPCOM) tested students in 52 high schools. Since participation in the study was voluntary, this sample was not nationally representative. In an earlier CNA study, the two samples were combined to develop tenth grade norms.

At present, the scores reported to students consist of three academic and four occupational composites of ASVAB subtests. The reporting system will change when ASVAB Form 14 is replaced by Forms 18 and 19. Students will receive standard scores on three composites and on the 10 ASVAB subtests. The purpose of this study is to develop and report norms for the new scores.

### NORMS

Since national samples are available, it is fairly simple to calculate norms for 11th and 12th grades, postsecondary schools, and the youth population. Frequencies of raw scores are smoothed, and then percentile ranks are computed from the smoothed frequencies. These are converted into percentile ranks for standard scores. Because a standard score has the same meaning on all ASVAB forms, the norms can be used with all ASVAB forms although they have been developed using Forms 8a and 14a, b, and c.

The problem in developing 10th grade norms was to estimate percentile ranks in a truly representative national sample by using data from the nonrandom MEPCOM sample. The percentile ranks could be estimated by adding information about 11th and 12th grades that is available in the PAY sample. The two data sets were used to obtain, for each composite and subtest, the transformation curve that converted



cumulative percentages in the MEPCOM sample into percentile scores in the PAY sample. The curve was then used to calculate national percentile scores for the 10th grade from score distributions in the MEPCOM sample. These calculations were performed separately for males and females.

The 10th grade norms describe the results that would have been obtained if 10th graders had been tested in the PAY study. Norms for the composites used at present, computed using the same methodology, have been reported to students since October 1986. The appendixes present norm tables for the three composites and ten subtests to be used starting with the introduction of Forms 18 and 19.

## CONTENTS

	Page
Introduction .....	1
Contents of the ASVAB .....	1
Norms for Grade 10 .....	2
Data .....	2
Description of Samples .....	2
Calculation of Norms .....	3
Norms for Standard Scores .....	5
Norms for Grade 10 .....	
Results .....	7
References .....	9
Appendix A. Norms for High School and Postsecondary Students .....	A-1 - A-15
Appendix B. Norms for Youth Population .....	B-1 - B-13

## INTRODUCTION

The Department of Defense (DOD) uses the Armed Services Vocational Aptitude Battery (ASVAB) to select and classify applicants to the four military services, and to assign enlistees to military jobs. In addition, the ASVAB is administered in participating high schools and postsecondary schools as part of the DOD Student Testing Program. It is taken by more than a million students per year in more than 15,000 schools. ASVAB results are useful to students and school officials as a counseling resource. Most norms for the ASVAB are based on a nationally representative sample tested in 1980 as part of the Profile of American Youth (PAY) study [1].

## Contents of the ASVAB

The ASVAB contains ten subtests--General Science (GS), Arithmetic Reasoning (AR), Word Knowledge (WK), Paragraph Comprehension (PC), Numerical Operations (NO), Coding Speed (CS), Auto and Shop Information (AS), Mathematics Knowledge (MK), Mechanical Comprehension (MC), and Electronics Information (EI). The Verbal (VE) raw score is defined as the sum of WK and PC scores. Subtests NO and CS are tests of speed in handling numerical and symbolic material. All others are power tests with liberal time limits. Standard scores rather than raw scores on the subtests are used in all decisions based on the ASVAB. Standard scores are integers from 20 to 80, with mean 50 and standard deviation 10 in the 1980 youth population.

At present, when ASVAB scores are reported to students and counselors, subtests are combined into three academic and four occupational composites. When ASVAB Forms 18 and 19 are introduced, only three composites will be reported in addition to subtest standard scores. The Verbal composite score is simply the VE raw scores converted to a standard score. The Mathematical Ability (MA) composite is the standardized sum of AR and MK standard scores:

$$MA = 50 + 10 (S\_AR + S\_MK - 99.970) / 19.115 ,$$

where the prefix S indicates standard score. The Academic Ability (AA) score is given by

$$AA = 50 + 10 (2 S\_VE + S\_AR + S\_MK - 199.896) / 36.350 .$$

All standard scores are rounded to integers; values less than 20 are replaced by 20. Percentile ranks, not raw or standard scores, are reported to students.

The DOD Student Testing Program provides the ASVAB, free of charge, to participating high schools and postsecondary schools. It has two major goals. One is to help students identify aptitudes and plan their education and careers. Toward this end, percentile scores are provided to students and counselors. The other goal is to help DOD attract

well-qualified volunteers. Therefore, ASVAB scores of 11th and 12th grade students are made available to military recruiters. Norms for 11th and 12th grade, postsecondary, and youth populations are based on examinees in the PAY sample, which includes ages 16 through 23. Norms are computed separately for men and women.

#### **Norms for Grade 10**

Proper interpretation of scores of 10th graders requires norms for this grade. Therefore, in 1984, the Military Entrance Processing Command (MEPCOM) administered the ASVAB to students in grades 9 to 12 in 52 schools that agreed to participate. Data for grades 10 to 12 were used for computing norms.

Because participation by schools was voluntary, the students tested did not constitute a nationally representative sample. Therefore, score distributions from the MEPCOM sample cannot provide national norms directly. However, they can be adjusted by using other information such as the PAY sample available for grades 11 and 12. The 11th and 12th grade data in the MEPCOM and PAY samples were combined to determine how to convert MEPCOM percentile ranks into national ones.

#### **DATA**

The PAY data were obtained by administering ASVAB Form 8a to a nationally representative sample of 11,914 persons, born during 1957 through 1964, in the summer of 1980 [1]. Some groups, such as blacks and Hispanics, were oversampled to get more precise information about minorities. Weights based on sex, race, ethnicity, and age were used to correct for the oversampling. Unweighted sample sizes were 1,277 for grade 11 and 1,216 for grade 12.

The MEPCOM sample available for this study consists of 10th to 12th grade students in 52 schools. To avoid biasing the sample through self-selection by students, the ASVAB was to be administered to every student in school on the day of testing. The MEPCOM sample is nonrepresentative mainly because the schools were self-selected; i.e., it includes only those schools that agreed to participate in the data collection. The ASVAB forms used were 14a, 14b, and 14c, which have been found to be parallel to Form 8a [2].

#### **DESCRIPTION OF SAMPLES**

Of the 11,914 individuals in the PAY sample, 203 had not been interviewed to get information such as their grade in school. Therefore they were excluded from analyses performed to obtain student norms. So were 36 examinees who were administered the battery in a nonstandard manner.

A student's grade was determined from the answer to interview question 21: "What grade or year of regular school are you attending?" [3]. If the response was "10" or "11," the student was treated as being in 11th or 12th grade in summer 1980. Two-year college students were identified from their answers to Question 26: "Is (was) the degree-granting college or university you are attending (last attended) a two-year or four-year school?" Irrespective of whether they had been interviewed, examinees born in 1962 or earlier were included in the youth sample, except those with nonstandard administration.

In the PAY study, each individual was assigned a weight so as to adjust for the oversampling of minorities. The weights added up to appropriate totals in the 1980 census (by age and sex within the samples of blacks, whites, and Hispanics), not to the sample size in hand ([1], p. 429). To allow for the difference between answer sheets used in the PAY study and those used by DOD, scores on the speed tests NO and CS were adjusted according to the results of Wegner and Ree [4]. Table 1 describes the composition of the sample used for norming.

The original MEPCOM data set consisted of 15,247 students in 52 schools. Test dates ranged from 28 September 1984 to 18 January 1985. Three schools were deleted because, in one or more grades, the numbers tested were much smaller than the enrollments. Two schools were excluded because they lacked data in one or more grades. Students were removed if they had missing data for race/ethnicity, because this information was necessary for weighting the cases to match the census percentages. Students were also deleted if the grade was unknown. If a student omitted all items on a subtest, the entire record was deleted because the examinee clearly lacked motivation. Details of the data editing are available in appendix A of [5].

Each student was assigned a weight so that, in each combination of sex and race/ethnicity in each grade, the percentage in the weighted MEPCOM sample would equal that in the 1980 census (table 260 in [6]). This corrects for the slight oversampling of minorities in the MEPCOM sample. Because of overlap between codes in MEPCOM data, the frequency of the "White, etc." category was defined as total minus blacks and Hispanics. The sample used for analysis is described in table 2. (While computing weights, a cohort in the MEPCOM sample was defined by grade whereas in the PAY sample it was defined by age. Hence the percentages in the last column of table 2 differ slightly from those in table 1.)

#### CALCULATION OF NORMS

Since a national sample was available, it was easy to calculate norms for 11th and 12th grades, two-year colleges, and the youth population. For each sex within each grade, distributions of raw scores were computed and smoothed with a five-point rolling average. The weights for the rolling average are given by Angoff ([7], p. 516). Cumulative percentages of the raw scores were computed from the smoothed frequencies.

Table 1. Description of PAY sample

Sample	<u>Unweighted sample</u>		<u>Weighted sample</u>	
	Frequency	Percent	Frequency	Percent
Grade 11				
Male	662	51.8	2,090,598	51.0
Female	615	48.2	2,007,039	49.0
Black	348	27.3	583,228	14.2
Hispanic	218	17.1	259,625	6.3
White, etc.	711	55.7	3,254,785	79.4
Total	1,277		4,097,638	
Grade 12				
Male	622	51.2	1,773,448	51.3
Female	594	48.8	1,682,322	48.7
Black	345	28.4	498,745	14.4
Hispanic	226	18.6	223,594	6.5
White, etc.	645	53.0	2,733,431	79.1
Total	1,216		3,455,770	
Postsecondary				
Male	306	41.2	982,400	43.8
Female	436	58.8	1,259,118	56.2
Black	169	22.8	249,572	11.1
Hispanic	101	17.7	151,175	6.7
White, etc.	442	59.6	1,840,77	82.1
Total	742		2,241,518	
Youth				
Male	4,550	49.6	12,891,151	50.7
Female	4,623	50.4	12,517,855	49.3
Black	2,298	25.1	3,470,260	13.7
Hispanic	1,342	14.6	1,544,187	6.1
White, etc.	5,533	60.3	20,394,559	80.3
Total	9,173		25,409,559	

Table 2. Description of MEPCOM sample

Sample	Unweighted sample		Weighted sample	
	Frequency	Percent	Frequency	Percent
Grade 10, N = 3,878				
Male	1,924	49.6	1,975	50.9
Female	1,954	50.4	1,903	49.1
Black	670	17.3	591	15.2
Hispanic	397	10.2	286	7.4
White, etc.	2,811	72.5	3,001	77.4
Grade 11, N = 3,263				
Male	1,622	49.7	1,651	50.6
Female	1,641	50.3	1,612	49.4
Black	607	18.6	479	14.7
Hispanic	298	9.1	221	6.8
White, etc.	2,358	72.3	2,563	78.6
Grade 12, N = 2,682				
Male	1,304	48.6	1,341	50.0
Female	1,378	51.4	1,341	50.0
Black	460	17.2	377	14.1
Hispanic	220	8.2	178	6.6
White, etc.	2,002	74.6	2,127	79.3

#### Norms for Standard Scores

For each raw score X, the corresponding standard score SS is given by

$$SS = 50 + 10 (X - m) / s ,$$

where m and s are the mean and standard deviation of the raw score in the 1980 youth population of 18-to-23-year-olds [1]. (The means and standard deviations are available in [8], among other sources.) This standard score was not rounded to integer. If there are n items in the subtest, there are n+1 such standard scores and corresponding cumulative percentages. Linear interpolation between these values was used to define the cumulatives for integer values of standard scores.

Take General Science as an example. Its mean and standard deviation in the youth population are 15.95 and 5.01 (table 2-2 in [8]). Therefore, raw scores 15 and 16 correspond to standard scores 48.1 and 50.1. Their cumulative percentages among 12th grade males are 39.1 and 46.4. Therefore, by linear interpolation, the percentile rank of a standard score of 49 is

$$39.1 + (49 - 48.1) (46.4 - 39.1) / (50.1 - 48.1) \\ = 39.1 + (0.9) (7.3) / 2 = 39.1 + 3.3 = 42.4 ,$$

which rounds to 42.

No such interpolation is required for the MA and AA composites because they are computed as standard scores. Smoothed frequencies lead directly to percentile ranks.

Once norms are computed for standard scores, they become applicable to all forms of the ASVAB. Therefore, even though the 1980 sample used Form 8a, the percentile ranks can be used with Forms 18 and 19 as well (and with all other ASVAB forms).

#### Norms for Grade 10

Results for grades 11 and 12 showed that, although weighting reduced the mean differences between scores in PAY and MEPCOM samples, the correction was far from adequate. Further adjustments were needed to obtain national percentiles from MEPCOM data. To develop grade norms from the MEPCOM sample, the relationship between this sample and the national one must be known. The relationship was found from data for grades 11 and 12, and then used to compute norms for grade 10. It was assumed that the relationship is the same for all grades (except for sampling error). Support for this assumption is presented in [5].

Raw score frequencies in the MEPCOM sample were smoothed using the rolling average. A cumulative MEPCOM percentage was computed for each raw score (or, in case of MA and AA, for each standard score). A given raw score has a MEPCOM cumulative percentage and a national percentile rank. The latter is a transformation of the former. For a subtest with  $n$  items we get  $n+1$  points of this transformation. For all other values of the MEPCOM cumulative, we compute the transformation by linear interpolation. This is done separately in 11th and 12th grades. The two transformations are averaged, and the average is used to calculate 10th grade norms.

For example, GS raw score 14 has a MEPCOM cumulative of 53.9 in the 10th grade male data. We need to transform this value to national percentile rank. Among 12th grade males, GS raw score 15 has MEPCOM



cumulative and national percentile rank of 49.0 and 39.1, respectively. For score 16 the values are 54.9 and 46.4. Therefore, for a MEPCOM cumulative of 53.9, the transformed value is

$$39.1 + (53.9 - 49.0) (46.4 - 39.1) / (54.9 - 49.0)$$

$$= 39.1 + (4.9)(7.3) / 5.9 = 39.1 + 6.1 = 45.2$$

Among 11th grade males, GS score 15 has MEPCOM and national percentiles of 52.9 and 50.4; the values for raw score 16 are 60.1 and 57.3. Therefore, using the 11th grade percentiles, the MEPCOM cumulative of 53.9 transforms into

$$50.4 + (53.9 - 52.9) (57.3 - 50.4) / (60.1 - 52.9)$$

$$= 50.4 + (1.0)(6.9) / 7.2 = 50.4 + 1.0 = 51.4$$

The average of these two transformed values is 48.3. Therefore, for 10th grade males, the national percentile rank of a GS raw score of 14 is 48.3. In actual calculations, the two grades were weighted in proportion to their frequencies, which led to a slightly higher weight for grade 11.

The transformation method for estimating 10th grade norms is robust in the sense that it does not involve any assumptions about the way in which PAY and MEPCOM samples differ. For instance, students in the MEPCOM sample were tested later in the year than those in the PAY sample. However, as long as any such influence operates in all grades, the assumption of grade-invariant transformation remains reasonable. Therefore, the norms calculated in this study describe the results that would have been obtained if 10th graders had been tested in the PAY study. Additional details of the method are given by Divgi and Horne [5].

## RESULTS

Results for high school and postsecondary students are presented in tables A-1 to A-13 of appendix A. Combined-sex norms were computed by averaging the percentile ranks of males and females, with the two sexes weighted according to their proportions in the 1980 census. Youth population norms are in tables B-1 to B-13 of appendix B. These norms can be used with any form of the ASVAB that has been equated to Form 8a and thus placed on the 1980 score scale.

## REFERENCES

- [1] Office of the Assistant Secretary of Defense (Manpower, Installations and Logistics), *Profile of American Youth: Demographic Influences on ASVAB Test Performance*, by R. Darrell Bock and Elsie G. J. Moore, Feb 1984
- [2] Air Force Human Resources Laboratory Technical Report 81-55, *Armed Services Vocational Aptitude Battery: Item and Factor Analyses of Forms 8, 9, and 10*, by Malcolm J. Ree, C. J. Mullins, John J. Mathews, and R. H. Massey, 1982
- [3] National Opinion Research Center. *The Profile of American Youth User's Guide and Codebook*. Chicago: National Opinion Research Center, 1982
- [4] Air Force Human Resources Laboratory, *Armed Services Vocational Aptitude Battery: Correcting the Speeded Subtests for the 1980 Youth Population*, by Toni Giuliano Wegner and Malcolm J. Ree, Jul 1985
- [5] CNA Research Contribution 562, *Development of 10th Grade Norms for the ASVAB*, by D. R. Divgi and Gary E. Horne, May 1987 (02056200)<sup>1</sup>
- [6] U.S. Bureau of the Census, *1980 Census of Population: Detailed Population Characteristics*. U.S. Summary Section A, United States, Mar 1984
- [7] W. H. Angoff, "Scales, Norms, and Equivalent Scores," in *Educational Measurement*, edited by Robert L. Thorndike. 2nd ed. Washington, D.C.: American Council on Education, 1971
- [8] CNA Report 116, *The ASVAB Score Scales: 1980 and World War II*, by Milton H. Maier and William H. Sims, Jul 1986 (94011600)

---

1. The number in parentheses is a CNA internal control number.

APPENDIX A

Norms for High School and Postsecondary Students

Table A-1. Male (M), Female (F), and Combined-Sex (C) Norms

Standard score	Subtest GS											
	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 24	1	1	1	1	1	1	1	1	1	1	1	1
25	2	1	1	2	1	1	1	1	1	1	1	1
26	2	2	2	2	1	2	1	1	1	1	1	1
27	3	3	3	3	2	2	1	2	2	1	1	1
28	4	4	4	3	3	3	2	2	2	1	1	1
29	5	5	5	4	4	4	3	3	3	2	1	1
30	6	6	6	5	5	5	3	4	4	2	1	1
31	7	8	8	6	6	6	4	5	5	2	2	2
32	9	11	10	7	8	7	5	6	6	2	2	2
33	10	14	12	8	10	9	6	7	7	2	3	2
34	12	17	14	10	12	11	7	9	8	2	3	3
35	14	21	17	11	15	13	9	11	10	3	4	4
36	16	24	20	13	17	15	10	14	12	4	5	4
37	19	28	24	15	20	18	12	18	15	5	7	6
38	22	32	27	17	23	20	14	21	17	5	8	7
39	25	36	30	19	27	23	16	25	20	6	10	8
40	28	41	34	22	30	26	19	28	23	7	12	10
41	31	45	38	25	34	29	21	32	26	8	15	12
42	34	49	41	28	38	33	23	35	29	9	18	14
43	38	52	45	32	42	37	25	39	32	11	22	17
44	41	56	49	35	47	41	28	42	35	12	26	20
45	45	60	52	39	51	45	30	46	38	15	30	23
46	48	64	56	43	56	49	33	49	41	17	34	26
47	52	68	60	47	60	53	36	53	44	20	38	30
48	56	71	64	50	64	57	39	58	48	23	41	33
49	60	74	67	53	67	60	42	62	52	27	46	37
50	64	77	71	57	70	64	46	66	56	30	51	42
51	68	80	74	61	73	67	51	70	60	35	57	47
52	71	83	77	65	76	71	55	74	64	39	63	52
53	75	85	80	69	79	74	60	77	68	43	68	57
54	78	87	82	72	83	77	65	80	72	46	73	62
55	81	89	85	75	85	80	69	83	76	50	77	66
56	83	91	87	78	88	83	73	85	79	54	81	69
57	86	92	89	81	90	86	77	87	82	58	84	73
58	89	94	91	83	93	88	81	89	85	62	88	76
59	91	95	93	86	94	90	84	91	88	67	90	80

Table A-1. (Continued)

Standard score	Subtest GS											
	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
60	93	96	95	89	96	92	87	93	90	71	92	83
61	94	98	96	92	97	94	90	94	92	75	94	86
62	96	99	97	94	97	96	92	96	94	79	95	88
63	97	99	98	96	98	97	93	97	95	83	97	91
64	98	99	99	98	99	98	94	98	96	87	98	93
65	99	99	99	99	99	99	96	99	97	90	99	95
66	99	99	99	99	99	99	97	99	98	94	99	97
67	99	99	99	99	99	99	98	99	99	97	99	99
> - 68	99	99	99	99	99	99	99	99	99	99	99	99

Table A-2. Male (M), Female (F), and Combined-Sex (C) Norms

Standard score	Subtest AR											
	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 30	1	1	1	1	1	1	1	1	1	1	1	1
31	2	1	2	1	1	1	1	1	1	1	1	1
32	3	3	3	2	2	2	1	2	2	1	1	1
33	5	5	5	4	3	4	2	4	3	1	2	1
34	8	7	7	6	5	6	4	6	5	1	3	2
35	10	10	10	9	8	9	6	8	7	2	4	3
36	14	14	14	12	11	12	8	11	10	3	6	4
37	17	19	18	15	15	15	11	14	12	4	8	6
38	21	25	23	19	19	19	13	17	15	5	11	8
39	25	31	28	22	23	23	16	21	19	7	13	10
40	29	37	33	26	28	27	19	26	22	8	16	13
41	34	42	38	30	32	31	22	29	26	10	19	15
42	39	47	43	34	36	35	26	33	29	12	23	18
43	44	51	48	37	40	39	30	37	33	14	26	21
44	48	56	52	41	44	42	34	41	37	17	29	24
45	51	60	56	45	48	46	37	46	42	19	32	27
46	55	65	60	49	51	50	41	51	45	21	36	29
47	58	69	63	52	55	53	43	53	48	24	40	33
48	61	72	66	55	59	57	46	56	51	25	43	35
49	63	75	69	58	63	60	49	59	54	27	47	38
50	66	78	72	60	67	64	52	64	58	28	50	40
51	69	80	74	64	71	67	55	68	61	29	53	43
52	71	82	77	66	74	70	57	72	64	32	57	46
53	74	84	79	69	77	73	59	75	67	35	59	49
54	77	86	81	72	80	76	61	76	69	39	62	52
55	80	88	84	74	82	78	64	78	71	43	65	56
56	83	90	86	77	84	80	66	81	73	47	69	60
57	85	91	88	79	86	82	69	82	76	52	73	64
58	88	92	90	81	88	85	73	84	78	57	78	69
59	90	94	92	84	90	87	77	86	82	62	82	73
60	92	95	93	86	92	89	81	89	85	67	85	77
61	93	96	94	89	93	91	85	91	88	72	88	81
62	94	97	96	91	94	92	89	93	91	76	92	85
63	96	98	97	93	96	94	91	95	93	81	95	89
64	97	99	98	96	97	96	94	96	95	86	97	92
65	99	99	99	98	99	98	96	98	97	92	99	96
66	99	99	99	99	99	99	99	99	99	98	99	99
> 67	99	99	99	99	99	99	99	99	99	99	99	99

Table A-3. Male (M), Female (F), and Combined-Sex (C) Norms

		Subtest WK											
	Standard Score	Grade 10			Grade 11			Grade 12			Post-Sec		
		M	F	C	M	F	C	M	F	C	M	F	C
<	20	1	1	1	1	1	1	1	1	1	1	1	1
	21	1	1	1	2	1	1	1	1	1	1	1	1
	22	2	1	1	2	1	1	1	1	1	1	1	1
	23	2	1	1	2	1	1	2	1	1	1	1	1
	24	3	1	2	3	1	2	2	1	1	1	1	1
	25	4	2	3	4	1	2	2	1	2	1	1	1
	26	5	3	4	5	1	3	3	1	2	1	1	1
	27	6	4	5	6	2	4	4	2	3	1	1	1
	28	7	5	6	7	3	5	5	3	4	1	1	1
	29	9	6	8	8	4	6	5	3	4	1	1	1
	30	10	8	9	10	5	8	6	4	5	1	1	1
	31	12	10	11	11	7	9	7	5	6	1	1	1
	32	14	13	13	13	8	10	7	6	7	1	2	2
	33	16	15	15	14	10	12	8	8	8	2	2	2
	34	17	17	17	16	13	14	9	9	9	2	2	2
	35	19	19	19	18	15	16	11	12	11	2	3	3
	36	21	21	21	20	16	18	12	13	13	2	3	3
	37	23	23	23	22	18	20	14	16	14	3	4	3
	38	25	25	25	24	20	22	15	18	17	3	5	4
	39	28	28	28	26	22	24	17	20	19	4	6	5
	40	30	31	31	28	24	26	19	23	21	5	8	7
	41	33	35	34	30	27	29	21	25	23	6	10	8
	42	36	39	38	33	30	32	23	27	25	7	12	10
	43	40	44	42	35	34	35	27	30	28	8	13	11
	44	44	48	46	37	39	38	30	33	31	9	15	13
	45	49	52	51	41	43	42	32	37	35	11	17	14
	46	54	56	55	44	47	45	35	40	38	12	20	16
	47	58	61	59	47	50	49	39	43	41	13	23	19
	48	62	65	64	51	54	53	43	46	45	15	27	22
	49	66	70	68	55	58	56	48	50	49	19	31	26
	50	70	75	73	59	63	61	52	55	53	23	34	29
	51	74	79	77	64	67	66	56	59	58	27	38	33
	52	79	83	81	69	71	70	60	64	62	31	41	36
	53	83	86	85	74	75	75	64	69	67	35	44	40
	54	87	89	88	79	78	79	69	74	71	40	49	45
	55	90	92	91	83	82	82	74	79	76	46	55	51
	56	93	94	93	88	85	86	79	82	80	54	61	58
	57	95	96	95	91	89	90	83	86	85	62	69	66
	58	97	97	97	94	93	93	88	90	89	70	77	74
	59	98	98	98	96	96	96	92	93	92	79	85	82
	60	99	99	99	98	98	98	95	97	96	88	93	91
	61	99	99	99	99	99	99	99	99	99	97	98	98
>	62	99	99	99	99	99	99	99	99	99	99	99	99

Table A-4. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest PC												
Standard Score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 19	1	1	1	1	1	1	1	1	1	1	1	1
20	2	1	1	2	1	1	1	1	1	1	1	1
21	2	1	2	2	1	2	1	1	1	1	1	1
22	3	1	2	3	1	2	1	1	1	1	1	1
23	4	1	3	4	1	3	2	1	1	1	1	1
24	5	2	4	6	1	4	2	2	2	1	1	1
25	6	3	5	7	2	4	3	2	3	2	1	1
26	7	4	6	8	3	5	4	3	3	2	1	1
27	9	5	7	9	4	7	5	3	4	2	1	1
28	11	7	9	11	5	8	6	4	5	2	1	2
29	13	8	10	12	6	9	7	5	6	3	1	2
30	15	10	12	14	7	10	8	6	7	3	2	2
31	17	11	14	15	8	12	9	7	8	4	2	3
32	20	13	16	17	9	13	11	8	10	4	2	3
33	22	14	18	19	11	15	12	9	11	4	3	3
34	25	16	21	21	12	17	14	10	12	5	3	4
35	27	18	23	23	13	18	15	11	13	5	4	4
36	29	20	25	26	15	20	17	12	15	6	4	5
37	32	22	27	28	17	22	18	13	16	6	5	6
38	34	24	29	30	18	24	20	14	17	7	6	6
39	36	27	32	32	20	26	22	16	19	7	7	7
40	39	29	34	34	23	28	24	17	21	8	8	8
41	41	32	37	36	25	30	27	19	23	9	9	9
42	44	35	39	38	27	33	29	21	25	10	10	10
43	46	38	42	41	29	35	32	23	27	12	11	11
44	49	41	45	43	31	37	34	25	30	13	12	13
45	52	45	48	46	34	40	37	28	32	15	14	15
46	55	48	51	49	37	43	39	31	35	17	16	17
47	57	52	55	52	40	46	42	34	38	19	18	18
48	61	56	58	56	44	50	45	39	42	22	22	22
49	64	60	62	59	48	54	48	43	46	25	26	26
50	68	64	66	63	52	58	52	47	50	28	30	29
51	72	68	70	67	57	62	56	53	54	34	36	35
52	76	73	74	70	62	66	60	58	59	40	42	41
53	80	77	79	74	67	71	65	63	64	46	49	47
54	84	81	82	79	72	76	70	68	69	53	55	54
55	88	85	86	83	77	80	75	74	75	61	62	62
56	91	89	90	87	82	85	80	80	80	69	69	69
57	93	91	92	91	86	89	84	84	84	75	75	75
58	96	94	95	94	90	92	89	89	89	81	81	81
59	98	97	97	97	94	96	93	94	93	88	87	87
60	99	98	98	98	96	97	95	96	96	92	92	92
61	99	99	99	99	98	99	98	98	98	96	96	96
> 62	99	99	99	99	99	99	99	99	99	99	99	99



Table A-5. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest NO												
Standard Score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 22	1	1	1	1	1	1	1	1	1	1	1	1
23	2	1	1	1	1	1	2	1	1	1	1	1
24	2	1	1	2	1	1	2	1	1	1	1	1
25	2	1	2	3	1	2	2	1	2	1	1	1
26	3	2	2	3	2	2	3	1	2	1	1	1
27	3	2	3	3	2	3	3	1	2	1	1	1
28	4	3	4	4	2	3	3	2	2	1	1	1
29	6	3	5	5	3	4	3	2	3	1	1	1
30	7	4	6	6	3	5	4	3	3	1	1	1
31	8	5	6	8	3	5	5	4	4	2	1	2
32	9	5	7	9	4	6	6	4	5	2	2	2
33	10	6	8	9	5	7	7	5	6	2	2	2
34	12	6	9	10	6	8	8	5	7	2	2	2
35	15	8	11	12	6	9	8	6	7	2	3	3
36	18	9	14	14	7	11	10	7	9	3	5	4
37	21	12	16	16	8	12	12	8	10	3	7	5
38	24	14	19	19	10	15	15	10	12	4	8	6
39	27	16	22	22	12	17	17	12	14	5	9	7
40	30	19	25	25	14	20	20	13	17	7	11	9
41	34	22	28	29	16	23	24	15	19	9	12	11
42	36	24	30	32	19	26	27	18	22	11	14	13
43	38	25	32	35	22	29	30	21	26	15	16	15
44	42	28	35	38	25	31	33	24	28	17	18	18
45	47	32	39	39	26	33	35	25	30	19	20	19
46	51	37	44	43	29	36	38	27	33	21	21	21
47	57	42	50	47	33	40	43	32	37	23	23	23
48	62	48	55	52	37	45	48	37	42	25	25	25
49	68	54	61	56	41	49	52	41	47	28	27	28
50	72	59	65	61	45	53	57	46	51	31	30	30
51	75	63	69	67	51	59	62	52	57	35	35	35
52	77	66	72	73	56	65	67	57	62	41	41	41
53	80	70	75	77	61	69	70	62	66	46	45	46
54	82	73	77	79	65	72	72	66	69	51	49	50
55	84	75	80	82	68	76	75	69	72	56	53	54
56	86	77	81	85	71	78	77	72	74	61	57	58
57	87	78	83	87	74	81	79	75	77	65	61	62
58	88	79	84	88	76	83	82	78	80	68	65	66
59	89	81	85	89	78	84	85	81	83	71	68	69
60	91	85	88	91	82	86	87	83	85	74	70	72
61	96	92	94	94	90	92	92	91	91	84	81	82
> 62	99	99	99	99	99	99	99	99	99	99	99	99

Table A-6. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest CS												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 24	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	2	1	1	1	1	1	1	1	1
26	2	1	1	2	1	2	1	1	1	1	1	1
27	3	1	2	3	2	2	2	1	1	1	1	1
28	4	1	3	5	2	3	3	1	2	1	1	1
29	6	2	4	6	3	4	4	1	3	1	1	1
30	7	3	5	8	3	5	5	2	3	1	1	1
31	9	3	6	9	3	6	5	2	4	1	1	1
32	10	4	7	10	4	7	7	3	5	2	2	2
33	12	5	9	11	5	8	7	3	5	2	2	2
34	14	6	10	12	6	9	9	3	6	3	3	3
35	17	7	12	14	6	10	11	5	8	4	3	4
36	19	9	14	16	7	12	12	6	9	5	4	5
37	21	10	16	18	8	13	13	7	10	6	5	5
38	23	12	18	22	10	16	15	8	12	7	6	6
39	27	14	21	24	11	18	17	9	13	9	8	8
40	31	16	23	27	12	20	19	10	15	11	9	10
41	34	18	26	32	15	23	23	12	18	13	11	12
42	38	21	30	36	16	27	26	14	20	14	12	13
43	44	25	35	40	19	30	30	16	23	16	13	15
44	51	29	40	45	21	34	34	19	26	19	15	17
45	56	35	46	51	25	38	38	21	30	22	17	19
46	60	40	51	57	29	43	44	27	36	26	19	22
47	66	45	56	61	34	48	49	33	42	30	20	24
48	72	51	61	65	38	52	54	40	47	35	22	28
49	76	57	66	70	44	57	59	45	52	41	26	33
50	79	62	71	75	50	63	65	50	57	48	29	37
51	82	67	75	80	57	69	70	55	63	52	34	42
52	84	72	78	82	62	72	74	60	67	54	39	46
53	88	76	82	84	65	75	77	63	70	57	43	49
54	91	81	86	88	71	80	82	69	76	62	48	54
55	95	85	90	90	75	83	85	74	80	66	53	59
56	96	88	92	93	81	87	89	78	84	73	59	65
57	97	92	94	95	85	90	93	81	87	78	64	70
58	97	94	95	96	88	92	95	84	90	82	70	75
59	98	95	97	97	91	94	97	86	92	84	73	78
60	98	96	97	98	94	96	97	89	93	87	77	81
61	98	97	97	98	95	96	97	92	95	88	81	84
62	99	97	98	98	96	97	98	93	96	91	84	88
63	99	98	99	98	97	98	99	94	97	94	87	90
64	99	98	99	99	97	98	99	95	97	95	90	92
65	99	99	99	99	98	99	99	97	98	96	93	95
66	99	99	99	99	99	99	99	98	99	97	94	96

Table A-6. (Continued)

Standard score	Subtest CS											
	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
67	99	99	99	99	99	99	99	98	99	97	95	96
68	99	99	99	99	99	99	99	98	99	98	96	97
69	99	99	99	99	99	99	99	99	99	98	97	98
70	99	99	99	99	99	99	99	99	99	98	98	98
71	99	99	99	99	99	99	99	99	99	99	98	98
> 72	99	99	99	99	99	99	99	99	99	99	99	99

Table A-7. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest AS												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 29	1	1	1	1	1	1	1	1	1	1	1	1
30	2	2	2	1	2	2	1	1	1	1	1	1
31	3	4	3	2	4	3	2	2	2	1	2	1
32	4	7	5	3	6	4	2	4	3	1	3	2
33	5	10	8	4	8	6	3	6	5	1	4	2
34	7	15	11	5	12	9	4	10	7	1	5	3
35	9	20	14	7	16	11	5	13	9	2	7	5
36	11	27	19	9	21	15	6	18	12	2	9	6
37	14	33	24	11	26	18	8	23	15	3	12	8
38	18	41	29	14	32	23	9	28	18	3	15	10
39	23	48	35	17	38	27	11	34	22	4	18	12
40	27	55	41	21	44	32	13	40	26	5	22	15
41	31	61	45	25	50	37	15	47	31	6	27	18
42	34	66	50	29	56	42	18	55	36	7	32	21
43	38	72	54	32	62	47	21	61	41	9	38	25
44	41	77	59	35	68	51	24	67	45	10	44	29
45	45	81	63	38	72	55	27	72	49	13	51	34
46	49	85	67	40	77	58	30	76	53	15	57	39
47	53	88	71	43	81	62	33	80	56	18	63	43
48	58	91	74	47	85	66	36	84	59	20	69	47
49	62	93	78	51	88	69	39	87	63	22	74	51
50	67	95	81	55	91	72	43	90	66	24	78	55
51	71	96	83	59	93	75	46	92	69	26	82	58
52	75	97	86	63	95	78	51	94	72	27	86	60
53	78	99	88	67	96	81	55	95	75	29	89	63
54	81	99	90	71	97	84	59	96	77	32	91	66
55	84	99	92	75	98	86	64	97	80	36	93	68
56	86	99	93	78	99	88	67	98	82	39	95	70
57	88	99	94	82	99	90	71	99	85	42	96	73
58	90	99	95	85	99	92	75	99	87	45	97	75
59	92	99	96	87	99	94	78	99	88	49	98	77
60	94	99	97	90	99	95	81	99	90	53	99	79
61	96	99	98	92	99	96	84	99	92	58	99	82
62	98	99	99	94	99	97	87	99	93	64	99	84
63	99	99	99	95	99	98	90	99	95	70	99	87
64	99	99	99	97	99	98	93	99	96	75	99	89
65	99	99	99	98	99	99	96	99	98	80	99	91
66	99	99	99	99	99	99	98	99	99	86	99	94
67	99	99	99	99	99	99	99	99	99	91	99	96
68	99	99	99	99	99	99	99	99	99	95	99	98
> 69	99	99	99	99	99	99	99	99	99	99	99	99

Table A-8. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest MK												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 30	1	1	1	1	1	1	1	1	1	1	1	1
31	2	1	1	2	1	1	1	1	1	1	1	1
32	3	1	2	3	1	2	1	1	1	1	1	1
33	4	2	3	4	1	3	1	1	1	1	1	1
34	5	3	4	6	2	4	3	2	2	1	2	1
35	8	4	6	9	4	6	4	3	4	1	2	2
36	11	6	9	11	7	9	6	5	6	2	3	3
37	15	9	12	14	10	12	9	8	8	3	5	4
38	19	13	16	18	13	15	12	11	11	4	7	5
39	24	17	21	21	17	19	15	14	15	6	10	8
40	29	21	25	25	20	23	19	18	19	8	13	10
41	34	26	30	30	24	27	23	22	23	9	16	13
42	38	32	35	34	28	31	27	26	27	11	19	15
43	42	37	40	39	32	36	31	31	31	12	22	18
44	46	43	44	43	36	40	36	37	36	15	24	20
45	50	47	49	47	40	43	39	42	41	17	27	23
46	54	51	53	50	43	47	43	47	45	20	30	26
47	58	55	57	53	46	50	46	51	48	24	34	29
48	62	59	60	56	49	53	50	54	52	27	38	33
49	66	62	64	59	52	55	53	57	55	30	42	37
50	69	66	67	61	54	58	56	60	58	33	45	40
51	72	70	71	64	56	60	59	62	60	35	48	43
52	75	73	74	65	59	62	62	64	63	39	51	46
53	77	76	77	67	61	65	65	67	66	43	54	49
54	80	79	79	70	64	67	67	69	68	48	57	53
55	82	81	82	73	67	70	69	72	70	53	61	58
56	85	83	84	76	70	73	71	75	73	55	66	61
57	87	85	86	79	73	76	73	77	75	58	70	65
58	88	87	88	81	76	78	75	80	77	60	75	68
59	90	89	90	82	78	80	78	82	80	64	78	72
60	91	92	91	84	81	82	80	84	82	67	82	75
61	93	94	93	86	83	84	82	86	84	71	85	79
62	94	95	95	87	86	87	84	88	86	75	89	83
63	96	96	96	89	88	89	87	89	88	79	92	86
64	97	97	97	92	91	91	89	91	90	84	94	89
65	98	98	98	95	93	94	92	93	93	89	95	92
66	99	99	99	97	95	96	95	96	95	93	97	95
67	99	99	99	99	98	98	97	98	98	97	99	98
> 68	99	99	99	99	99	99	99	99	99	99	99	99

Table A-9. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest MC												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 28	1	1	1	1	1	1	1	1	1	1	1	1
29	1	2	1	1	1	1	1	1	1	1	1	1
30	2	3	2	2	2	2	1	1	1	1	2	1
31	3	4	3	3	3	3	1	2	1	1	3	2
32	4	6	5	4	5	4	1	4	3	1	4	3
33	6	8	7	5	6	6	2	6	4	1	5	3
34	8	11	9	7	9	8	3	8	6	2	7	5
35	10	14	12	9	11	10	4	11	7	2	9	6
36	13	19	16	11	15	13	6	13	10	3	11	8
37	15	24	19	13	19	16	8	17	12	4	14	9
38	18	30	24	15	24	19	9	21	15	4	16	11
39	21	35	28	17	29	23	11	25	18	5	19	13
40	24	41	32	20	34	27	13	30	21	6	23	16
41	28	47	37	23	39	31	16	35	25	7	27	18
42	31	52	41	26	44	35	19	41	30	8	31	21
43	35	57	46	29	49	39	22	46	34	10	35	24
44	39	62	51	31	55	43	25	51	38	12	40	27
45	43	67	55	34	60	47	29	56	42	14	44	31
46	47	72	59	37	65	51	32	61	46	16	49	34
47	50	76	63	41	69	54	35	66	50	18	53	38
48	53	80	67	44	73	58	37	71	54	21	58	42
49	56	84	70	48	76	62	41	75	58	24	62	45
50	60	87	73	51	80	65	45	79	61	27	66	49
51	63	90	76	55	83	68	49	82	65	29	70	52
52	66	92	79	58	86	72	53	85	68	32	75	56
53	70	94	82	62	89	75	56	87	71	35	78	59
54	73	95	84	66	91	78	59	90	74	38	82	63
55	76	96	86	70	93	81	62	92	77	42	85	66
56	79	97	88	73	94	83	65	94	79	46	88	69
57	82	98	90	76	96	86	68	95	81	50	91	73
58	85	98	91	79	96	88	71	96	83	52	93	75
59	88	98	93	82	97	89	74	97	86	55	94	77
60	90	98	94	86	97	91	78	98	88	59	95	79
61	93	99	96	89	98	93	81	98	89	63	96	82
62	95	99	97	91	98	95	84	99	91	68	97	85
63	96	99	98	94	99	96	88	99	93	74	98	87
64	97	99	98	95	99	97	91	99	95	79	99	90
65	98	99	99	97	99	98	93	99	96	84	99	93
66	99	99	99	98	99	99	96	99	98	88	99	95
67	99	99	99	99	99	99	97	99	99	92	99	96
68	99	99	99	99	99	99	99	99	99	95	99	98
69	99	99	99	99	99	99	99	99	99	97	99	99
> 70	99	99	99	99	99	99	99	99	99	99	99	99

Table A-10. Male (M), Female (F), and Combined-Sex (C) Norms

Subtest EI												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 26	1	1	1	1	1	1	1	1	1	1	1	1
27	2	2	2	1	1	1	1	2	1	1	1	1
28	2	4	3	2	2	2	1	3	2	1	1	1
29	3	6	5	3	3	3	1	4	2	1	1	1
30	4	8	6	4	5	4	2	5	3	1	1	1
31	6	11	9	5	7	6	3	7	5	1	2	1
32	8	15	11	6	10	8	3	10	6	1	3	2
33	10	19	14	8	13	11	5	13	8	1	4	3
34	13	23	18	10	17	13	6	16	11	1	6	4
35	16	27	21	12	21	16	7	19	13	2	8	5
36	19	31	25	14	25	20	9	22	15	2	10	7
37	22	35	28	17	29	23	10	26	18	2	13	8
38	25	39	32	20	33	26	12	30	21	3	16	10
39	29	43	36	22	38	30	14	34	24	4	19	12
40	32	48	40	25	42	33	16	39	27	5	23	15
41	36	53	44	28	46	37	19	43	31	6	27	17
42	39	58	48	31	51	41	21	48	34	7	31	20
43	43	63	52	35	56	45	24	53	38	9	35	23
44	46	67	57	38	60	49	27	59	42	10	39	26
45	50	72	60	42	64	53	29	63	46	12	43	30
46	53	76	64	45	69	57	32	68	50	14	48	33
47	57	80	68	49	73	61	35	72	53	16	52	37
48	60	84	72	52	77	65	39	76	57	18	57	40
49	64	87	75	56	82	68	42	79	60	20	62	44
50	67	90	78	59	85	72	46	82	64	23	67	48
51	71	93	81	63	89	75	50	85	67	25	72	52
52	74	94	84	66	91	78	54	88	70	28	76	55
53	77	96	86	70	94	82	58	90	74	31	80	58
54	80	97	89	74	95	84	62	92	77	34	83	62
55	83	98	91	77	96	87	66	94	79	38	86	65
56	86	99	92	81	97	89	69	95	82	43	88	68
57	89	99	94	84	98	91	73	96	84	48	90	72
58	91	99	95	86	99	93	76	97	86	53	92	75
59	92	99	96	89	99	94	80	98	88	58	94	78
60	94	99	97	91	99	95	83	98	90	63	95	81
61	95	99	98	93	99	96	86	99	92	69	97	84
62	96	99	98	95	99	97	89	99	94	74	98	87
63	97	99	99	96	99	98	91	99	95	80	98	90
64	98	99	99	97	99	99	93	99	96	85	99	93
65	99	99	99	98	99	99	95	99	97	89	99	95
66	99	99	99	99	99	99	96	99	98	93	99	97
67	99	99	99	99	99	99	97	99	99	96	99	98
68	99	99	99	99	99	99	98	99	99	98	99	99
> 69	99	99	99	99	99	99	99	99	99	99	99	99

Table A-11. Male (M), Female (F), and Combined-Sex (C) Norms

Composite VA													
Standard Score	Grade 10			Grade 11			Grade 12			Post-Sec			
	M	F	C	M	F	C	M	F	C	M	F	C	
<	21	1	1	1	1	1	1	1	1	1	1	1	1
	22	2	1	1	2	1	1	1	1	1	1	1	1
	23	2	1	1	3	1	2	1	1	1	1	1	1
	24	3	1	2	3	1	2	2	1	1	1	1	1
	25	4	2	3	4	1	2	3	1	2	1	1	1
	26	5	2	4	4	2	3	3	2	3	1	1	1
	27	6	3	5	6	2	4	4	2	3	1	1	1
	28	8	5	6	7	3	5	5	2	4	1	1	1
	29	9	6	8	9	4	6	5	4	4	1	1	1
	30	11	8	10	10	5	8	6	5	5	1	1	1
	31	13	10	11	12	7	10	7	5	6	2	1	1
	32	15	12	13	14	8	11	8	7	7	2	1	1
	33	17	14	15	16	9	13	9	8	8	2	2	2
	34	19	16	17	17	11	14	10	10	10	2	2	2
	35	21	18	19	19	13	16	11	11	11	2	2	2
	36	23	20	21	21	15	18	13	13	13	3	3	3
	37	25	22	23	23	17	20	15	14	14	3	4	4
	38	27	24	25	25	18	22	16	16	16	4	5	4
	39	29	26	28	27	20	24	18	18	18	4	6	5
	40	32	29	31	29	23	26	19	20	19	5	7	6
	41	35	33	34	31	26	28	21	21	21	6	8	7
	42	38	37	37	33	28	31	23	23	23	7	10	8
	43	41	41	41	36	31	33	25	24	25	8	12	10
	44	45	44	45	38	34	36	28	27	28	8	13	11
	45	50	49	49	41	38	39	32	31	32	10	15	12
	46	54	54	54	44	42	43	36	35	36	11	16	14
	47	58	58	58	48	46	47	39	39	39	14	19	17
	48	61	63	62	51	51	51	42	41	42	16	22	20
	49	65	67	66	55	55	55	46	44	45	19	27	23
	50	68	72	70	60	59	59	51	49	50	23	30	27
	51	73	76	75	64	62	63	55	55	55	27	34	31
	52	77	80	78	68	67	67	59	61	60	30	38	35
	53	81	83	82	73	71	72	63	66	65	33	43	39
	54	84	86	85	77	76	76	68	72	70	39	47	43
	55	88	89	88	80	80	80	72	77	75	45	52	49
	56	92	92	92	84	83	84	77	81	79	53	60	57
	57	95	95	95	89	87	88	83	84	83	62	69	66
	58	97	96	97	94	91	93	88	88	88	71	77	75
	59	98	98	98	97	95	96	92	93	92	81	85	83
	60	99	99	99	99	98	98	95	96	96	91	92	91
	61	99	99	99	99	99	99	98	98	98	97	98	98
	>	62	99	99	99	99	99	99	99	99	99	99	99



Table A-12. Male (M), Female (F), and Combined-Sex (C) Norms

Composite AA												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 25	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	2	1	1	1	1	1	1	1	1
27	2	1	1	3	1	1	1	1	1	1	1	1
28	3	1	2	3	1	2	2	1	1	1	1	1
29	4	2	3	5	1	3	2	2	2	1	1	1
30	6	3	5	6	2	4	3	2	3	1	1	1
31	8	5	7	7	3	5	5	3	4	1	1	1
32	11	7	9	9	4	7	6	5	5	1	1	1
33	13	10	11	11	6	9	7	6	7	1	1	1
34	15	12	13	14	8	11	9	8	8	2	2	2
35	18	15	16	17	10	14	9	9	9	2	3	2
36	21	18	19	19	13	16	10	11	11	2	4	3
37	25	21	23	22	16	19	12	13	13	2	5	4
38	28	24	26	25	19	22	15	16	16	3	6	5
39	31	27	29	28	22	25	18	18	18	4	8	6
40	33	32	32	30	24	27	21	21	21	6	9	8
41	36	37	36	33	27	30	23	23	23	8	11	10
42	39	41	40	35	29	32	26	26	26	9	13	11
43	43	45	44	37	34	35	28	29	28	10	15	12
44	46	48	47	40	38	39	30	33	31	11	17	14
45	51	52	51	42	42	42	32	36	34	13	21	17
46	55	56	55	46	45	46	35	39	37	14	24	20
47	58	60	59	50	48	49	39	43	41	16	27	22
48	61	65	63	53	50	52	43	48	45	17	29	24
49	64	70	67	56	53	54	47	52	50	19	32	26
50	68	74	71	60	57	58	52	56	54	22	35	29
51	72	78	75	63	62	62	55	60	58	25	40	33
52	75	80	78	66	67	66	58	64	61	29	44	37
53	79	83	81	69	71	70	61	68	65	34	49	42
54	82	85	83	73	75	74	66	72	69	39	54	47
55	85	87	86	76	78	77	70	76	73	43	59	52
56	87	89	88	79	81	80	74	80	77	49	65	58
57	90	91	91	82	83	83	77	83	80	56	71	65
58	92	93	93	84	86	85	81	86	83	62	76	70
59	94	95	95	87	89	88	85	87	86	66	80	74
60	96	97	97	90	91	90	88	89	89	71	86	79
61	98	98	98	93	92	93	90	91	91	76	91	84
62	99	99	99	96	95	95	92	94	93	82	94	89
63	99	99	99	98	97	97	94	97	95	90	97	94
64	99	99	99	99	99	99	97	98	98	96	99	98
> 65	99	99	99	99	99	99	99	99	99	99	99	99

Table A-13. Male (M), Female (F), and Combined-Sex (C) Norms

Composite MA												
Standard score	Grade 10			Grade 11			Grade 12			Post-Sec		
	M	F	C	M	F	C	M	F	C	M	F	C
< 32	1	1	1	1	1	1	1	1	1	1	1	1
33	3	2	3	2	1	2	1	1	1	1	1	1
34	6	3	5	5	2	4	2	3	3	1	1	1
35	9	6	7	8	4	6	4	5	4	1	2	2
36	13	10	11	12	8	10	7	8	7	2	3	3
37	16	13	15	15	11	13	9	10	10	3	5	4
38	20	17	18	18	14	16	11	13	12	4	7	5
39	23	21	22	21	18	20	14	16	15	5	9	7
40	28	26	27	26	22	24	18	21	20	7	13	10
41	32	33	33	30	26	28	23	25	24	9	17	13
42	38	40	39	33	30	32	26	29	28	12	19	16
43	43	45	44	37	35	36	29	34	31	14	22	19
44	48	50	49	41	40	41	33	39	36	16	27	22
45	51	54	53	45	44	45	36	43	39	18	30	25
46	55	58	57	49	47	48	39	47	43	19	34	27
47	58	62	60	53	50	51	43	52	47	21	37	30
48	61	66	64	56	54	55	47	56	51	23	41	33
49	63	69	66	58	56	57	50	58	54	24	43	35
50	66	72	69	60	59	59	52	60	56	26	45	37
51	69	74	72	62	62	62	55	63	59	30	47	40
52	73	78	75	65	66	65	58	66	62	34	50	43
53	76	81	78	68	69	69	61	69	65	38	55	47
54	79	83	81	71	72	72	64	72	68	41	60	52
55	82	85	83	74	75	75	67	75	71	44	66	56
56	84	87	86	76	78	77	70	78	74	49	69	60
57	86	90	88	78	80	79	73	81	77	55	73	65
58	88	91	90	80	83	81	76	84	80	59	77	69
59	91	93	92	81	85	83	79	85	82	62	81	73
60	92	94	93	83	87	85	82	86	84	64	83	75
61	93	94	94	85	89	87	84	87	85	67	86	77
62	94	95	94	87	90	89	86	89	87	71	89	81
63	95	97	96	90	92	91	88	91	90	77	92	85
64	96	98	97	92	94	93	90	93	92	83	94	89
65	98	99	99	95	95	95	93	95	94	88	96	92
66	99	99	99	97	97	97	95	97	96	93	98	96
67	99	99	99	99	99	99	98	99	98	97	99	98
> 68	99	99	99	99	99	99	99	99	99	99	99	99

APPENDIX B

Norms for Youth Population

Table B-1. Subtest GS

Standard score		M	F	C
<	26	1	1	1
-	27	2	2	2
	28	2	2	2
	29	3	3	3
	30	4	4	4
	31	4	5	5
	32	5	6	6
	33	6	8	7
	34	7	9	8
	35	9	10	10
	36	10	12	11
	37	12	14	13
	38	13	16	15
	39	15	19	17
	40	17	21	19
	41	19	25	21
	42	20	28	24
	43	23	32	27
	44	25	35	30
	45	28	40	34
	46	30	44	37
	47	34	48	41
	48	37	52	44
	49	40	56	48
	50	44	60	52
	51	47	64	55
	52	51	68	59
	53	55	71	63
	54	58	75	66
	55	62	78	70
	56	65	82	73
	57	68	85	76
	58	72	87	79
	59	75	90	82
	60	78	92	85
	61	81	94	88
	62	84	96	90
	63	87	97	92
	64	90	98	94
	65	93	99	96
	66	95	99	97
	67	98	99	99
>	68	99	99	99

Table B-2. Subtest AR

	Standard Score	M	F	C
<	31	1	1	1
	32	2	2	2
	33	3	4	3
	34	5	5	5
	35	6	8	7
	36	9	11	10
	37	11	14	13
	38	14	18	16
	39	17	22	19
	40	20	26	23
	41	22	29	26
	42	25	33	29
	43	28	36	32
	44	31	40	35
	45	33	43	38
	46	36	46	41
	47	39	49	44
	48	41	53	47
	49	44	56	50
	50	46	59	53
	51	49	62	55
	52	51	65	58
	53	54	68	61
	54	57	70	64
	55	60	73	66
	56	63	75	69
	57	66	78	72
	58	69	81	74
	59	72	83	77
	60	75	86	80
	61	79	88	83
	62	82	90	86
	63	86	93	89
	64	90	95	92
	65	94	97	96
>	66	99	99	99

Table B-3. Subtest WK

Standard score		M	F	C
<	22	1	1	1
-	23	2	1	1
	24	2	2	2
	25	3	2	3
	26	4	3	3
	27	5	3	4
	28	5	4	5
	29	6	5	5
	30	7	5	6
	31	8	6	7
	32	9	7	8
	33	10	8	9
	34	11	9	10
	35	13	10	12
	36	14	12	13
	37	15	13	14
	38	16	15	15
	39	17	17	17
	40	19	18	18
	41	20	20	20
	42	22	21	22
	43	24	23	24
	44	26	26	26
	45	28	28	28
	46	30	30	30
	47	32	33	33
	48	35	36	35
	49	38	39	38
	50	41	42	42
	51	44	46	45
	52	48	50	49
	53	53	54	53
	54	57	58	58
	55	62	63	63
	56	67	68	68
	57	73	74	73
	58	79	80	79
	59	85	86	85
	60	91	92	92
	61	98	98	98
>	62	99	99	99

Table B-4. Subtest PC

	Standard score	M	F	C
<	21	1	1	1
-	22	2	1	1
	23	2	2	2
	24	3	2	2
	25	4	3	3
	26	4	3	4
	27	5	4	5
	28	6	5	5
	29	8	5	6
	30	9	6	7
	31	10	7	9
	32	11	8	10
	33	13	9	11
	34	14	10	12
	35	16	11	13
	36	17	12	15
	37	19	13	16
	38	20	14	17
	39	22	16	19
	40	24	17	20
	41	25	18	22
	42	27	20	24
	43	29	21	25
	44	31	23	27
	45	33	25	29
	46	36	28	32
	47	38	30	34
	48	41	33	37
	49	44	37	41
	50	48	40	44
	51	52	45	49
	52	57	50	54
	53	61	55	58
	54	67	62	64
	55	73	68	70
	56	78	74	76
	57	83	79	81
	58	88	84	86
	59	93	90	91
	60	95	93	94
	61	98	97	97
>	62	99	99	99

Table B-5. Subtest NO

Standard Score		M	F	C
<	22	1	1	1
-	23	2	1	1
	24	2	2	2
	25	3	2	2
	26	3	2	3
	27	3	3	3
	28	4	3	3
	29	4	4	4
	30	5	4	5
	31	6	5	6
	32	8	6	7
	33	9	6	7
	34	9	6	8
	35	10	7	9
	36	12	8	10
	37	14	9	12
	38	16	11	13
	39	18	13	15
	40	20	15	17
	41	22	17	20
	42	25	19	22
	43	28	22	25
	44	30	24	27
	45	32	25	29
	46	34	27	31
	47	37	30	34
	48	41	33	37
	49	44	36	40
	50	48	40	44
	51	52	45	49
	52	58	50	54
	53	61	54	58
	54	65	57	61
	55	68	61	65
	56	71	65	68
	57	74	68	71
	58	77	71	74
	59	79	73	76
	60	82	76	79
	61	89	85	87
>	62	99	99	99



Table B-6. Subtest CS

Standard score	M	F	C
< 25	1	1	1
26	2	1	2
27	2	2	2
28	3	2	3
29	4	3	4
30	6	4	5
31	7	4	6
32	8	5	7
33	9	6	7
34	10	6	8
35	11	7	9
36	13	8	11
37	14	9	12
38	16	10	13
39	18	11	15
40	20	12	16
41	23	14	18
42	26	15	20
43	29	17	23
44	32	19	26
45	36	22	29
46	40	24	32
47	45	27	36
48	49	30	40
49	53	34	44
50	58	38	48
51	62	42	52
52	66	46	56
53	68	48	59
54	72	53	63
55	76	58	67
56	80	63	72
57	84	68	76
58	87	73	80
59	89	76	83
60	91	80	86
61	92	84	88
62	94	87	90
63	95	89	92
64	96	91	94
65	98	93	96
66	98	95	97
67	98	96	97
68	99	97	98
69	99	97	98
70	99	98	99
> 71	99	99	99

Table B-7. Subtest AS

Standard Score	M	F	C
< 29	1	1	1
30	1	2	2
31	2	3	2
32	2	4	3
33	3	6	4
34	4	8	6
35	5	10	7
36	6	13	9
37	7	17	12
38	8	21	14
39	9	25	17
40	11	30	20
41	12	35	24
42	14	41	27
43	16	46	31
44	18	51	34
45	20	57	38
46	22	63	42
47	24	68	46
48	26	73	49
49	28	78	53
50	30	82	56
51	33	85	59
52	36	88	62
53	39	91	65
54	42	93	67
55	46	95	70
56	49	96	73
57	53	97	75
58	57	98	77
59	61	99	79
60	65	99	82
61	69	99	84
62	74	99	86
63	79	99	89
64	83	99	92
65	88	99	94
66	92	99	96
67	95	99	98
68	98	99	99
> 69	99	99	99

Table B-8. Subtest MK

	Standard score	M	F	C
<	32	1	1	1
	33	2	2	2
	34	3	3	3
	35	5	5	5
	36	7	8	7
	37	10	11	10
	38	13	14	14
	39	17	18	18
	40	21	22	22
	41	25	27	26
	42	29	31	30
	43	32	35	34
	44	36	39	38
	45	39	43	41
	46	43	46	45
	47	46	50	48
	48	49	53	51
	49	52	56	54
	50	54	59	57
	51	56	62	59
	52	59	64	61
	53	61	66	64
	54	63	68	66
	55	66	71	68
	56	68	73	71
	57	70	76	73
	58	72	79	75
	59	75	81	78
	60	77	84	80
	61	79	86	82
	62	81	88	85
	63	84	91	87
	64	87	93	90
	65	90	95	93
	66	94	97	95
	67	97	99	98
>	68	99	99	99

Table B-9. Subtest MC

Standard score		M	F	C
<	29	1	1	1
-	30	1	2	1
	31	1	2	2
	32	2	4	3
	33	3	6	4
	34	4	8	6
	35	5	10	8
	36	7	14	10
	37	8	17	13
	38	10	21	15
	39	12	25	18
	40	14	29	21
	41	16	34	25
	42	18	38	28
	43	20	43	31
	44	22	47	34
	45	25	52	38
	46	27	56	41
	47	30	60	45
	48	33	64	48
	49	35	67	51
	50	38	71	54
	51	41	75	58
	52	44	78	61
	53	46	82	64
	54	49	84	67
	55	53	87	70
	56	56	89	72
	57	60	91	75
	58	63	93	78
	59	67	95	80
	60	70	96	83
	61	74	97	85
	62	78	98	88
	63	81	98	90
	64	85	99	92
	65	89	99	94
	66	92	99	96
	67	95	99	97
	68	97	99	98
	69	98	99	99
>	70	99	99	99

Table 10. Subtest EI

Standard Score		M	F	C
<	27	1	1	1
-	28	1	2	1
	29	2	2	2
	30	2	3	3
	31	3	5	4
	32	4	6	5
	33	5	9	7
	34	6	11	8
	35	7	13	10
	36	8	16	12
	37	10	19	14
	38	11	23	17
	39	13	26	19
	40	14	30	22
	41	16	33	24
	42	18	37	27
	43	20	41	30
	44	21	45	33
	45	24	49	36
	46	26	53	39
	47	28	57	43
	48	31	62	46
	49	33	66	49
	50	36	70	53
	51	39	74	56
	52	42	78	59
	53	45	81	63
	54	48	84	66
	55	52	87	69
	56	56	89	72
	57	60	91	75
	58	65	93	79
	59	70	94	82
	60	74	96	85
	61	79	97	88
	62	83	98	90
	63	87	99	93
	64	90	99	94
	65	93	99	96
	66	95	99	97
	67	97	99	98
>	68	98	99	99
-	69	99	99	99

Table 11. Composite VA

	Standard Score	M	F	C
< -	22	1	1	1
	23	2	1	1
	24	2	1	2
	25	3	2	2
	26	4	2	3
	27	5	3	4
	28	5	4	5
	29	6	5	6
	30	7	5	6
	31	9	6	7
	32	10	7	8
	33	11	8	10
	34	12	9	11
	35	13	10	12
	36	14	11	13
	37	15	13	14
	38	17	14	15
	39	18	16	17
	40	19	17	18
	41	21	19	20
	42	23	20	22
	43	24	22	23
	44	26	24	25
	45	28	26	27
	46	30	28	29
	47	33	30	31
	48	35	33	34
	49	38	36	37
	50	41	40	40
	51	45	43	44
	52	48	47	48
	53	52	51	52
	54	57	56	57
	55	62	61	62
	56	68	67	67
	57	74	73	74
	58	80	79	80
	59	86	86	86
	60	92	92	92
	61	98	97	97
> -	62	99	99	99

Table 12. Composite AA

Standard score		M	F	C
<	27	1	1	1
-	28	2	2	2
	29	3	2	3
	30	4	3	4
	31	5	4	5
	32	7	5	6
	33	8	7	7
	34	10	8	9
	35	11	10	10
	36	13	11	12
	37	15	13	14
	38	16	15	16
	39	18	17	18
	40	20	19	20
	41	22	21	22
	42	24	24	24
	43	27	26	26
	44	29	29	29
	45	31	32	32
	46	33	36	34
	47	35	39	37
	48	39	42	40
	49	42	46	44
	50	45	49	47
	51	48	53	50
	52	51	57	54
	53	54	60	57
	54	58	65	61
	55	62	68	65
	56	66	72	69
	57	70	76	73
	58	73	79	76
	59	77	83	80
	60	80	86	83
	61	84	90	87
	62	87	92	90
	63	91	95	93
	64	96	98	97
>	65	99	99	99

Table 13. Composite MA

	Standard score	M	F	C
<	32	1	1	1
-	33	2	2	2
	34	3	3	3
	35	5	5	5
	36	8	9	8
	37	10	12	11
	38	13	15	14
	39	15	19	17
	40	20	24	22
	41	23	28	25
	42	27	31	29
	43	29	35	32
	44	33	39	36
	45	35	43	39
	46	38	46	42
	47	41	50	45
	48	44	53	49
	49	46	56	51
	50	49	58	53
	51	51	60	56
	52	54	63	59
	53	57	66	61
	54	59	69	64
	55	62	72	67
	56	65	75	70
	57	69	77	73
	58	71	80	75
	59	74	82	78
	60	75	84	80
	61	77	86	82
	62	80	88	84
	63	83	91	87
	64	86	93	89
	65	89	95	92
	66	94	97	95
	67	98	99	98
>	68	99	99	99